Introduction to Java Programming

Lab 1 - March 19, 2019

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Becoming a competent programmer requires a lot of practice. The following questions will provide practice with the contents of class: primitive data types, operators, arrays, and creating classes.

(1) **[Topics: printing to screen, mathematical operators]** You need to do some accounting work for your company, MiniCorp. You have the following earnings over three years:

Year	Earnings (dollars)
2012	-2,000
2013	100
2014	3,000

Write a program (in the main function of a new class) that:

(i) Prints 3 separate lines to the output pane:

```
"The earnings for Year X is Y dollars."
```

where you should substitute the correct year for X, and substitute the correct dollar amount for Y.

(ii) Calculates the average earnings over all 3 years and prints this on the next line with the statement:

```
"The average earnings is Z."
```

where Z is the average earnings rounded up to the nearest dollar (it is okay to have a number of the form x.0).

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(2) **[Topics: mathematical operators, dealing with an input argument]** In the USA, we typically measure temperature using the Fahrenheit scale. In Canada, we tend to use the Celsius scale.

Since your Canadian friend is visiting Mississippi, you'd like to tell her the temperature so she can pack appropriate clothing. The conversion between the two scales is as follows:

$$C = (F - 32)(5/9)$$

where C is temperature in degrees Celsius, and F is temperature in degrees Fahrenheit.

Create a new project called TempConverter and write a program (in main) that takes in an argument which is F and outputs C to the output pane.

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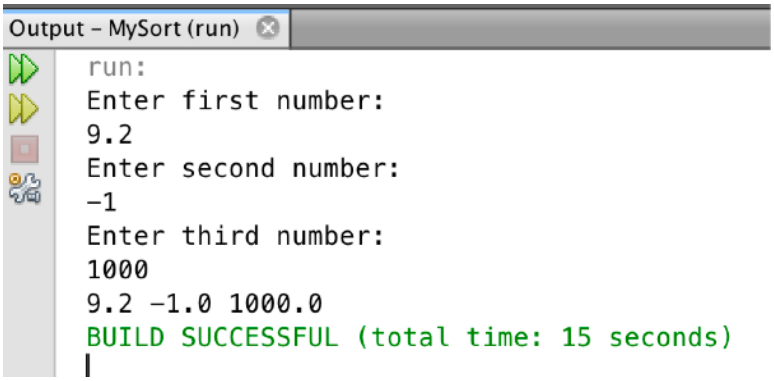
(3) **[Topics: mathematical operators, user input, arrays]** Sorting numbers from least to greatest is an important operation. Create a new project named MySort, and write code inside of main that does the following:

(i) Prompts the user for 4 unique numbers consecutively, each number entered separately.

(ii) Stores these integers in a 1D double array A of size 4.

(iii) Prints the contents of A separated by a space to the output pane.

Here is an example of the execution as given by the output pane:



Hint: To take input from the user, I recommend using the Scanner class. To use this class, you need to include it with the statement:

```
import java.util.Scanner;
```

before the line:

```
public class MySort
```

To use this inside of main, you need to create an instance of the Scanner object with the line:

```
Scanner input = new Scanner(System.in);
```

To read input from the user and store it with the variable x, you can write:

```
double x = input.nextDouble();
```

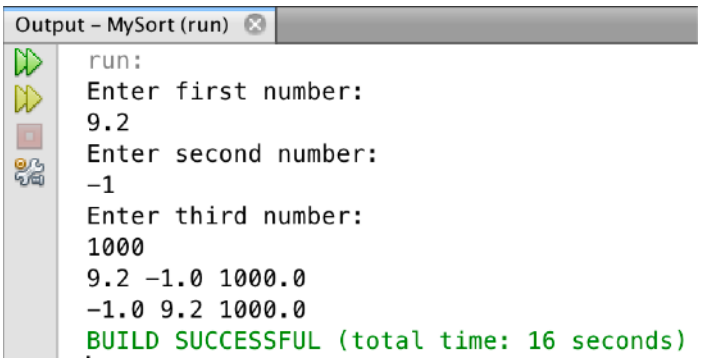
You may assume that the user provides legitimate input to the program. But, out of curiosity, what happens if the input is not a number?

(Optional 4) **[Topics: sorting, if-else statements]** Let's extend our program in Question 3 by having it do the following:

(iii) Create a new 1D double array B of size 4 with the elements of A sorted from least to greatest.

(iv) Prints the sorted elements to screen separated by a space.

Here is an example execution of the program:



In your program, you should use the mathematical operators < and >. Note that you don't need to test for equality since we are guaranteed that the numbers entered by the user are unique.

Given numbers x and y, you will find the following kind of statement helpful:

```
if(x< y){
   [code1];
}
else{
   [code2];
}
```

This is an if-else statement. It lets you test whether a condition is true. If x<y is true, then the statements of code1 will execute. Otherwise, the statements of code2 will execute. Use these if-else statements to compare and sort the elements given to you by the user.

Aftermath: Hopefully, writing this sorting program has given you a sense that sorting is a non-trivial task. Instead of sorting just 4 numbers, would you be able to ***easily*** extend your program to sort 100 numbers?